

## PATENT COOPERATION TREATY

PCT

REC'D 21 MAR 2005

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY PCT  
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>020211PC</b>	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. <b>PCT/SE 2003/001887</b>	International filing date (day/month/year) <b>04.12.2003</b>	Priority date (day/month/year) <b>23.12.2002</b>
International Patent Classification (IPC) or national classification and IPC <b>F23C 3/00, F23D 14/76</b>		
Applicant <b>Sandvik AB et al</b>		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

a.  (sent to the applicant and to the International Bureau) a total of 2 sheets, as follows:

sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).

sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

b.  (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s))  
containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

<input checked="" type="checkbox"/>	Box No. I Basis of the report
<input type="checkbox"/>	Box No. II Priority
<input type="checkbox"/>	Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/>	Box No. IV Lack of unity of invention
<input checked="" type="checkbox"/>	Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/>	Box No. VI Certain documents cited
<input type="checkbox"/>	Box No. VII Certain defects in the international application
<input checked="" type="checkbox"/>	Box No. VIII Certain observations on the international application

Date of submission of the demand <b>14.06.2004</b>	Date of completion of this report <b>28.02.2005</b>
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## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/SE 2003/001887

## Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

This report is based on a translation from the original language into the following language \_\_\_\_\_, which is the language of a translation furnished for the purposes of:

international search (under Rules 12.3 and 23.1(b))  
 publication of the international application (under Rule 12.4)  
 international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

the international application as originally filed/furnished  
 the description:

pages 1 - 9 \_\_\_\_\_ as originally filed/furnished  
 pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_  
 pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

the claims:

pages \_\_\_\_\_ as originally filed/furnished  
 pages\* \_\_\_\_\_ as amended (together with any statement) under Article 19  
 pages\* 1 - 2 \_\_\_\_\_ received by this Authority on 19.11.2004  
 pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

the drawings:

pages 1 - 2 \_\_\_\_\_ as originally filed/furnished  
 pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_  
 pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3.  The amendments have resulted in the cancellation of:

the description, pages \_\_\_\_\_  
 the claims, Nos. \_\_\_\_\_  
 the drawings, sheets/figs \_\_\_\_\_  
 the sequence listing (*specify*): \_\_\_\_\_  
 any table(s) related to the sequence listing (*specify*): \_\_\_\_\_

4.  This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

the description, pages \_\_\_\_\_  
 the claims, Nos. \_\_\_\_\_  
 the drawings, sheets/figs \_\_\_\_\_  
 the sequence listing (*specify*): \_\_\_\_\_  
 any table(s) related to the sequence listing (*specify*): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/SE 2003/001887

Box N . V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

## 1. Statement

Novelty (N)	Claims	<u>1-14</u>	YES
	Claims	_____	NO
Inventive step (IS)	Claims	<u>1-14</u>	YES
	Claims	_____	NO
Industrial applicability (IA)	Claims	<u>1-14</u>	YES
	Claims	_____	NO

## 2. Citations and explanations (Rule 70.7)

The documents cited in the international Search Report:

D1: GB, 907 504, A  
 D2: US, 3 724 447, A  
 D3: US, 3 174 474, A  
 D4: US, 5 932 885, A

The claimed invention relates to a method of reducing material wear resulting from temperature gradients in a furnace heating burner.

D1, considered the most relevant document, discloses a radiant burner (figure 1) comprising an inner tube (2) and an outer tube (1), which surrounds the inner tube (2) and has a closed bottom (10). Combustion gases are intended to flow through the inner tube (2) and back through the space between the inner (2) and outer tube (1). There is arranged a plate (11) at a distance from both the aperture (6) of the inner tube (2) and the closed bottom (10) of the outer tube (1). The object of the plate (11) is to protect the closed bottom (10) from thermal load (page 1, lines 40-53). A gas space is formed between the plate (11) and the closed bottom (10) of the outer tube (1).

The burner of the invention differs from the burner of D1 in that the inner tube is not arranged with radial apertures. This feature, however, is not clearly stated in claim 1. Apart from the construction of the inner tube the claimed burner according to claim 1 and 8 differs from the burner in D1 in that the bottom plate fully covers the cross section of the

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## Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: **BOX V**

outer pipe. In the burner of D1 the plate (11) only covers a part of the cross section of the outer tube (1). Hence, a full shielding of the bottom of the outer tube can not be achieved with the plate (11) of D1.

None of the other cited documents discloses a method and burner arrangement as stated in claims 1-14 of the claimed invention.

Therefore, the invention defined in claims 1-14 is novel and is considered to involve an inventive step. The invention is industrially applicable.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

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Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

According to Article 6 PCT the claims shall be clear.

In claim 3, dependent of claim 1, it is stated that an insulating material shall occupy the volume between the inner bottom plate (8) and the bottom (9) of the outer pipe (5). However, claim 3 seems to contradict claim 1 where it is stated that a gas pocket is created

## CLAIMS

1. A method relating to the operation of a burner and/or cooler (3), wherein gases are caused to flow through an inner pipe (7), out into an outer pipe (5), which has a closed bottom (9) and which surrounds the inner pipe (7), and back through that part of the volume of the outer pipe (5) not accommodated by the volume of the inner pipe (7), **characterised** by placing an inner bottom plate (8) in the outer pipe (5) in spaced relationship with the closed bottom (9) of said outer pipe (5) and by that the bottom plate (8) fully covers the cross-section of the outer pipe (5) and is placed perpendicular to the longitudinal axis of the outer pipe, whereby the gases flowing through the inner pipe (7) and out into the outer pipe (5) are caused to turn back towards said bottom plate (8) and pass between the outer pipe (5) and the inner pipe (7), thereby creating a gas pocket (12) between the bottom (9) of said outer pipe and the bottom plate (8).
2. A method according to Claim 1, **characterised** by causing the through-passing gases to either comprise hot products of combustion from combustion gas or cooling air.
3. A method according to Claim 2, **characterised** by causing an insulating material (14) to occupy the volume between the inner bottom plate (8) and the bottom (9) of the outer pipe (5).
4. A method according to Claim 2 or Claim 3, **characterised** by placing an insert (10) between the bottom (9) of the outer pipe (5) and the inner bottom plate (8) to improve the bearing capacity of the inner bottom plate (8) when no insulating material is used or when the insulating material (14) that is used is not sufficiently supportive to impart a sufficiently high bearing capacity to the inner bottom plate (8).
5. A method according to Claim 4, **characterised** by fastening the insert (10) mechanically to the bottom (9) of the outer pipe (5).
6. A method according to Claim 4, **characterised** by fastening the inner bottom plate (8) mechanically to the insert (10).

7. A method according to any one of Claims 1 to 6, **characterised** by constructing the pipe system from FeCrAl.

8. A burner and/or cooler (3) comprising an inner pipe (7) and an outer pipe (5) which surrounds the inner pipe (7) and has a closed bottom, wherein gases are intended to flow through the inner pipe (7) and back through that part of the volume of the outer pipe (5) which is not accommodated by the volume of the inner pipe (7), **characterised** by an inner bottom plate (8) which is located in the outer pipe (5) in spaced relationship with the closed bottom (9) of the outer pipe (5) and between the closed bottom of the outer pipe and the mouth of the inner pipe and by that the bottom plate (8) fully covers the cross-section of the outer pipe (5) and is placed perpendicular to the longitudinal axis of the outer pipe.

9. A burner and/or cooler according to Claim 8, **characterised** in that the gas burner is adapted to be through-passed by gases which either consist of hot products of combustion from combustion gas or of cooling air.

10. A burner and/or cooler according to Claim 9, **characterised** by an insulating material (14) which occupies the volume between the inner bottom plate (8) and the bottom (9) of the outer pipe (5).

11. A burner and/or cooler according to Claim 9 or Claim 10, when no insulating material is used or when the bearing capacity of any insulating material (14) used is insufficient to impart a sufficiently high bearing capacity to the inner bottom plate (8), **characterised** by an insert (10) which is placed between the bottom (9) of the outer pipe (5) and the inner bottom plate (8) such as to enhance the bearing capacity of the inner bottom plate (8).

12. A burner and/or cooler according to Claim 11, **characterised** in that the insert (10) is fastened mechanically to the bottom (9) of the outer pipe (5).

13. A burner and/or cooler according to Claim 11, **characterised** in that the inner bottom plate (8) is fastened mechanically to the insert (10).

14. A burner and/or cooler according to any one of Claims 8 to 13, **characterised** in that the pipe system is comprised of FeCrAl.